CHAPTER 8
COMMISSIONING

8-1. General commissioning

Commissioning, the process of verifying and documenting that the installed systems are in compliance with the design intent and specified performance criteria, is critical to the performance of utility systems in C4ISR facilities in general.

a. In one sense, application of the LVD concept may simplify the commissioning process, as it permits independent commissioning of the utility systems of each peripheral zone. If the scaleable, or modular, approach to design is used, as described in chapter 2, Fundamentals of Limited Vulnerability Design, the same process and procedures can be applicable to all of these zones.

b. On the other hand, the systems within the command center that allow it to be successfully isolated from the peripheral zones are more complex than typical and may represent a potential single point of failure for the mission.

c. For these reasons, the following features of the commissioning process in an LVD facility require special emphasis:

(1) The SCADA system, particularly within the command center, must be thoroughly commissioned.

(2) Functional testing under actual operating load or simulated (load bank) conditions must occur to verify the ability of the peripheral zone systems to support the command center load under all contingency conditions.

(3) Design features that ensure integrity of barriers between zones, such as conduit seals and wall penetration systems, which typically may not be included in the scope of commissioning, must be addressed.

(4) Commissioning procedures should be developed that will verify not only the operation of the isolation means in the utility supplies to the command center but also that the isolation will take place quickly enough for internal systems to be unaffected by the external event.

(5) Commissioning should include an integrated system test that simulates the worst-case event that the systems are designed to survive.

8-2. Applicable commissioning codes and standards

In addition to the ASHRAE Guideline 1, which provides valuable guidance for commissioning HVAC systems, the primary references for commissioning utility systems in C4ISR facilities are the following:

a. TM 5-601, Supervisory Control and Data Acquisition Systems for Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) Facilities, chapter 8

b. TM 5-694, Commissioning of Electrical Systems for Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) Facilities

c. TM 5-697, Commissioning of Mechanical Systems for Command, Control, Communications, Computer, Intelligence, Surveillance, and Reconnaissance (C4ISR) Facilities

8-3. Commissioning process

The LVD concept provides an opportunity to improve the traditional commissioning process by intentionally not taking full advantage of the reduction in labor afforded by the modular design of the peripheral zones. Two or more commissioning teams, working from the same definition of design intent and performance criteria, can independently develop and execute testing procedures, with each team commissioning an appropriate fraction of the peripheral zones. At the completion of testing, the teams debrief with the intention of reviewing each problem or malfunction revealed by each team's test procedure and verifying that the alternate procedure(s) would also have identified that problem or malfunction. If the teams determine that a problem may be able to slip through a procedure undetected, duplicate procedures may be applied to the systems.